MATERIAL AND EQUIPMENT STANDARD

FOR

ASPHALT MASTIC (COLD APPLIED)

ORIGINAL EDITION

MAY 1993

This standard specification is reviewed and updated by the relevant technical committee on June 1998(1) and Aug. 2006(2). The approved modifications are included in the present issue of IPS.

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1. SCOPE

This Standard Specification which is generated from SSPC-Paint No. 12 covers the minimum requirements for the composition, analysis, properties, storage life and packaging, inspection and labeling of asphalt mastic (cold applied).

Note 1:

This standard specification is reviewed and updated by the relevant technical committee on June 1998. The approved modifications by T.C. were sent to IPS users as amendment No. 1 by circular No. 32 on June 1998. These modifications are included in the present issue of IPS.

Note 2:

This standard specification is reviewed and updated by the relevant technical committee on Aug. 2006. The approved modifications by T.C. were sent to IPS users as amendment No. 2 by circular No 307 on Aug. 2006. These modifications are included in the present issue of IPS.

2. REFERENCES

Throughout this Standard the following dated and undated standards/codes are referred to. These referenced documents shall, to the extent specified herein, form a part of this standard. For dated references, the edition cited applies. The applicability of changes in dated references that occur after the cited date shall be mutually agreed upon by the Company and the Vendor. For undated references, the latest edition of the referenced documents (including any supplements and amendments) applies.

SSPC (STEEL STRUCTURES PAINTING COUNCIL)

SSPC No. 12	"Cold-Applied Asphalt Mastic"
SSPC-PA Guide 3,	"A Guide to Safety in Paint Application"

ASTM (AMERICAN SOCIETY FOR TESTING AND MATERIALS)

(Specification for Ingredients)

D235	"Petroleum Spirits (Mineral Spirits)"

(Specification for Packaging)

D3951 (88)	"Standard Practice for Commercial Packaging"

(Test Methods for Properties)

B117	"Salt Spray (Fog) Testing"
D5	"Penetration of Bituminous Materials"
D1010	"Asphalt Emulsions for Use as Protective Coatings for Metal"
D1296	"Odors of Volatile Solvents and Diluents"
D1856	"Recovery of Asphalt from Solution by Abson Method"

D2369	"Volatile Content of Paints"
D3278	"Flash Point of Liquids by Setaflash Closed Tester"

UFS (US FEDERAL STANDARDS)

(Standard Specifications for Ingredients)

TT-C-520	"Coating Compounds, Bituminous, Solvent Type, Underbody for Motor Vehicles"
TT-T-291	"Thinner, Paint, Mineral Spirits, Regular and Odorless"

(Federal Test Method Standard No. 141)

Method 3011	"Condition in Container"
Method 3021	"Skinning (Partially Filled Container)"
Method 4021	"Pigment Content (Centrifuge)"
Method 4053	"Nonvolatile Vehicle Content"
Method 4203	"Reducibility and Dilution Stability"
Method 4311	"Volume Percentage of Pigment in Total Nonvolatile Matter (calculation Method)"

ANSI (AMERICAN NATIONAL STANDARDS INSTITUTE)

ANSI Z129.1	"Precautionary Labeling of Hazardous Industrial Chemicals"

IPS (IRANIAN PETROLEUM STANDARDS)

IPS-E-TP-100	"Paints"

3. UNITS

International System of Units (SI) in accordance with IPS-E-GN-100 shall be used.

4. COMPOSITION

4.1 Ingredients and Proportions

Ingredients and proportions shall be as specified in Table 1 and Sections 4.2 through 4.4.

The mastic bared on the specified ingredients shall be uniform, stable in storage, and free from grit and coarse particles. No waste, coal tar or coal tar solvents may be added.

4.2 Percentage

The asphalt mastic shall contain maximum 40% by weight of inorganic fillers and minimum 60% by weight of vehicle. Vehicle shall consist of 55 ±10% by weight asphalts and 45 ±10% by weight petroleum solvents.

4.3 Fillers

The Fillers used shall be suitable inorganic minerals (such as Mica, Silicate or Slate Flour) and short fiber asbestos. Sand and other harsh abrasive materials shall not be used. The fillers (exclusive of asbestos) shall be fine enough to pass through a 0.043 mm sieve opening (325 mesh screen). Not more than 15% by weight of the total mastic shall be retained on a 0.043 mm sieve opening as determined by washing the mastic through the screen with suitable solvent.

4.4 Vehicles

4.4.1 Asphalts

The Bitumens shall consist of asphalts, either naturally occurring or petroleum derived, and may include up to 50% by weight of gilsonite (natural asphalt); any petroleum asphalt used shall be a straight run, steam or vacuum refined residue and shall be air blown in accordance with good commercial practice.

4.4.2 Petroleum solvents

The volatile solvents shall consist of any suitable aliphatic petroleum solvents with a minimum flash point of 32°C such as white spirits thinners.

TABLE 1 - COMPOSITION

INGREDIENTS	REQUIRED Min. Wt%	REQUIRED Max. Wt%	INGREDIENT STANDARDS ASTM METHOD	INGREDIENT STANDARDS US FEDERAL STANDARD
FILLER (40 Wt. % Max.) INORGANIC FILLER CONTAINS SHORT FIBER ASBESTOS AND FREE INERT MATERIAL	-------	100	-------	-------
VEHICLE (60 Wt. % Min.)				
ASPHALTS	45	65	-------	-------
MINERAL SPIRIT THINNER	35	55	D235	TT-T-291 GRADE I OR EQUIVALENT

5. ANALYSIS

The mastic shall conform to the composition (analysis) requirements of Table 2.

TABLE 2 - ANALYSIS

CHARACTERISTICS	REQUIREMENTS Min. Wt%	Max. Wt%	ASTM METHOD	US FEDERAL STD. No. 141
FILLER (Wt.%)	-------	40	D1856	4021*
VOLATILES (Wt.%)	-------	38	D2369	------
NONVOLATILE BITUMENS CALCULATED BY DIFFERENCE (Wt.%)	27	------	-------	4053
PIGMENT% BY VOLUME OF NONVOLATILE	--------	25	-------	4311

*** Use benzene and extract at least five times.**

6. PROPERTIES

6.1 The mastic shall meet the requirements of Table 3 and Sections 6.2 through 6.17.

6.2 Odors

The odor shall be normal for the materials permitted (ASTM Standard D1296).

6.3 Color

The color shall be black.

6.4 Compatibility

There shall be no evidence of incompatibility of any of the ingredients of the mastic when two volumes of the mastic are slowly mixed with one volume of mineral spirits (US Federal Standard No. 141, Method 4203).

6.5 Skinning

There shall be no skinning in a three quarters filled closed container after 48 hours when tested in the standard manner specified in US Federal Standard No. 141, Method 3021.

6.6 Working Properties

The mastic shall be capable of application by brush and trowel in addition to spraying with standard high pressure spray equipment of the types recommended for the application of mastic. The consistency shall be such that it may be sprayed at a temperature of 10°C with a tank pressure of not more than 550 kPa gage and no more than 550 kPa gage air pressure on the gun nozzle. A coating thus applied shall be uniform, continuous, and free from any pinholing.

6.7 Sag Test

A 3 mm, wet film coating of the mastic shall not sag when suspended vertically for one hour immediately after spraying, and there shall be no flowing and piling up of the coating on the lower half of the panel.

6.8 Drying Time

A wet film of coating, sufficient to deposit a 1,600 microns thick dry film shall set to touch in four hours and shall reach practical hardness in 36 hours at a test temperature of 21-24°C and 45%-55% relative humidity.

6.9 Hardness

The dry,cured mastic shall have a penetration of not more than 1.0 mm at 25°C, 2.0 mm at 35°C, 7.5 mm at 66°C or 15 mm at 82°C when tested according to ASTM Standard D5 using a 50 gram weight.

The coating is considered to have reached practical hardness when film pressure between the thumb and the fingers shown a slightly touchy condition, but the film is not ruptured and none of the coating appears to the finger.

6.10 Acid and Alkali Resistance

Spray a coating of the mastic on both sides of degreased 10 × 30 cm cold rolled steel panels to give a dry film thickness of approximately 1600 microns. After the coating has dried for 24 hours, bake ten days at 52°C and allow to cool at room temperature.

Seal the panels around the edges with a high melting point wax by dipping each edge approximately 66 mm in a molten solution of the wax and then immerse in test solutions of acids and alkalis to a depth of 15 cm for 30 days at 24°C or ten days at 52°C. On removal the panel shall be rinsed in tap water, wiped dry with a soft rag, and observed for any marked change in appearance. The coating shall then be removed by solvent cleaning and the panel surface examined for evidence of pitting and rusting. The panel shall show no sign of attack after immersion for 30 days in 10% solutions of hydrochloric acid, sulfuric acid, and sodium hydroxide. On removal of the coating by solvent cleaning, the panel surface shall be free from any pitting or rusting.

6.11 Corrosivity

Precleaned, polished strips of copper, aluminum, and steel of any convenient size, but not less than 12 mm × 76 mm shall be completely immersed in a bath of the mastic at a temperature of 77-82°C for 24 hours. The strips shall then be removed, rinsed with a petroleum naphtha solvent, and dried. The strips shall be examined for evidence of staining or corrosion. The steel strips shall show no trace of corrosion. Copper and aluminum strips shall show no more staining and corrosion than similarly prepared strips heated for 24 hours in an oven 77-82°C but not immersed in the compound.

6.12 Fire Resistance

Spray and condition a coating of the compound on three steel panels 7.6 cm × 15 cm as in section 6.10. Suspend one of the test panels vertically in a shielded hood. A laboratory burner with the air supply shut off and the flame regulated to 5 cm length shall be placed under the panel so that the lower end of the panel is in the flame 2.5 cm. The flame shall be allowed to remain under the test panel for 20 seconds. After the flame is withdrawn, the time that the flaming continues shall be observed. This test shall be run in triplicate and the results averaged. The dry coating may char, but shall not support combustion for more than ten seconds when the flame source is removed.

6.13 Resistance to Flow at Elevated Temperature

Spray and condition a coating of the compound as in section 6.10 parallel lines spaced 1 cm apart shall be drawn across the width of the surface. The panel shall then be suspended in a vertical position in an oven at 160-166°C for 24 hours. On removal, observe the surface of the coating for shifting of the lines. There shall be no evidence of flow or creep.

6.14 Salt Spray Resistance

Prepare three steel panels as in Section 6.10 then expose 450 hours to a salt spray (fog) as prescribed in ASTM Standard B 117, "Salt Spray (Fog) Testing". On removal from the salt (fog) cabinet observe the surface for evidence of rusting and pinholing. The coating shall be tested for lifting by inserting a spatula under the coating along one of the waxed edges and noting whether it lifts easily from the panels or adheres firmly. Lifting of the coating as a solid film or in an area of 26 square cm or more shall be cause for rejection. The coating shall then be removed by solvent cleaning and the panel surface observed for pitting and rusting. The coating shall show no signs of blistering or excessive lifting, upon removal of the coatings, the steel surface shall be free of pitting or rusting.

6.15 Cold-Temperature Adhesion

A 1600 microns dry film coating of the mastic shall be prepared and tested as specified in US Federal Specification TT-C-520, "Coating Compound, Bituminous, Solvent Type, Underbody (for Motor Vehicles);" it shall be subjected to successive slams at angles of 70, 80, and 90 degrees in the slamming machine specified. Any loosening, flaking, or chipping off shall not exceed 5% of the total area at -23°C.

6.16 Abrasion Resistance

Spray and condition a coating of the mastic as in Section 6.10 and lay the panel flat in sandblasting cabinet. The coating shall then be subjected to 20 passes of the blast from a suction type sandblast gun conforming to the following dimensions: diameter of air orifice 6 mm; diameter of nozzle 12 mm; inside diameter of sand hose 3 cm; length of sand hose 3 m; air pressure at a nozzle 6-7 Kg/cm^2 gage; mesh of sand 20-45.

The sandblast gun shall traverse the 10 cm width of the panel in not less than two seconds at a distance of 2.5 cm from the surface of the coating. After 20 passes with the sandblast gun, the blasted area shall be examined for evidence of film failure. The coating shall not be cut through to bare metal at any point.

6.17 Water Vapor Transmission

The water vapor permeability of a 1600 microns thick dry coating of the mastic prepared on a porous base and cured as in Section 6.10 shall not be over 0.4 grm per square meter per 24 hours under a vapor pressure differential of 11.8 mm of mercury at 25°C. The test shall be made with standard permeability glass cups each containing 40 cc of water, and covered with a sample of the dry coating. The units are sealed with wax and placed in a room or container held at 50% relative humidity and 25°C. At different intervals of time, the cells are weighed separately. The weight loss is taken as the amount of water vapor (weight per 24 hours per area)lost by diffusion through the coating after equilibrium in water vapor transmission has been established.

TABLE 3 - PROPERTIES

CHARACTERISTICS	REQUIREMENTS Min.	Max.	ASTM METHOD
DENSITY Kg/Lit	0.96	1.14	D 1010
FLASH POINT OF SOLVENTS, DEGREES C.	32	------	D 3278

7. STORAGE LIFE AND PACKAGING

7.1 Condition in Container

The mastic shall show no thickening, curdling, gelling, or hard caking when tested as specified in US Federal standard No. 141, Method 3011, after storage for 24 months from date of delivery (unless otherwise specified by the Company), in a full, tightly covered container.

7.2 Packaging

The packaging shall meet the relevant requirements of ASTM D3951 (88) unless otherwise specified by purchaser.

8. INSPECTION

8.1 All materials supplied under this specification shall be subject to timely inspection by the purchaser or his authorized representative. The purchaser shall have the right to reject any material(s) supplied which is (are) found to be defective under this specification. In case of dispute, the arbitration or settlement procedure, established in the procurement documents shall be followed.

8.2 Samples of any or all ingredients used in the manufacture of this paint may be requested by the purchaser and shall be supplied upon request, along with the supplier's name and identification for the material.

8.3 Unless otherwise specified, the methods of sampling and testing should be in accordance with US Federal Test Method Standard No. 141, or applicable methods of the American Society for Testing and Materials.

9. LABELING

9.1 Refer to ANSI standard Z 129.1 "Precautionary Labeling of Hazardous Industrial Chemicals".

9.2 Marking of Containers

Each container shall be legibly marked with the following information:

Name: Asphalt Mastic (cold Applied)
Specification: IPS-M-TP-105
MESC No. : .....
No of components .....
Maximum temperature resistance ....
Type of spray ....
Kind and size of spray nozzle tip ....
Cleaning material . .....
Flash point °C ....
Pot life (hours) ....
Drying time for overcoating ....
Kind of thinner ....
Color: Black ....
Lot Number: ....
Stock Number: ....
Date of Manufacture: ....
Quantity of Mastic in Container: ....
Manufacturer's Name and Address: ....
Design Guide: For guidance on the usage of this paint for various application/environments

and temperature range, reference shall be made IPS-E-TP-100 "Paints".

9.3 Directions for Use

The following directions for use shall be supplied with each container of mastic:

Directions for Use of Asphalt Mastic (Cold Applied)

- This mastic is used to protect steel from corrosion in severe surroundings. It will perform best if applied over blast cleaned or pickled steel; however, it may be used over well cleaned steel if all rust scale, loose rust, loose mill scale, and loose or nonadherent paint are removed. Oil and grease should be removed. For severe exposure, apply over a thoroughly dry rust-inhibitive primer.

- Mix the mastic thoroughly before use.

- Apply by spray, using high pressure spray equipment. If applied by brush, apply with a daubing action.

- Apply to the specified film thickness or, if none is specified, to at least 1600 microns dry or approximately 3200 microns wet. The surface to be painted shall be dry; the surface temperature shall be at least 3°C above the dew point; and the temperature of the air shall be over 4°C. Do not paint outdoors in rainy weather or if freezing expected before the paint dries. Under normal conditions, this mastic will dry for recoating in 243 hours, but it will remain soft for long periods.

9.4 Directions for Safety

The following directions for safety shall be supplied with each container of mastic:

-Mastic is hazardous because of its flammability and potential toxicity. Proper safety precautions shall be observed to protect against these recognized hazards. Safe handling practices are required and should include, but not be limited to, the provisions of SSPC-PA Guide 3, "A Guide to Safety in Paint Application" and to the following:

-Keep mastic away from heat, sparks and open flame during storage, mixing and application. Provide sufficient ventilation to maintain vapor concentration at less than 25% of the lower explosive limit.

-Avoid prolonged or repeated breathing of vapors of spray mists, and prevent contact of the paint with the eyes or skin.

-Clean hands thoroughly after handling mastic and before eating or smoking.

-Provide sufficient ventilation to insure that vapor concentrations do not exceed the published permissible exposure limits. When necessary, supply appropriate personal protective equipment and enforce its use.

-This mastic may not comply with some air pollution regulations because of its hydrocarbon solvent content.

-Ingredients in this paint which may pose a hazard include asbestos, hydrocarbon solvent, and asphalt. Applicable regulations governing safe handling practices shall apply to the use of this mastic.